Myth Busters:
Debunking Apprehensions Around Operational Changes

Tennessee Water and Wastewater Utility Partnership

October 12, 2016

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Introduction

Goal: **To demonstrate how your utility can confidently embrace an aggressive approach to energy savings:**

- **Save Power Costs**
- **Improve Plant Performance**
- **Accomplish success at Little to no Cost**

First off, things are confidential…

"On the Internet, nobody knows you're a dog."

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We're going to work closely with you…

- We want your trust
- We're here to make your plant look good…or even better
- If we DON'T find any savings, there is nothing to lose
- The price is right, too. ☺

We'll Look at Two Case Studies

Sheffield Alabama WWTP

Muscle Shoals Alabama WWTP

Many plants are saving a great deal of money..!!

We have several plants that are saving greater than $50,000 and even >$125,000 per year in power costs

Examples include:

- **Alexander City**
- **Prichard**
- **Albertville**
- **West Escambia**

But we're going to discuss…

Two Alabama plants that embraced an energy savings mind set to optimize plant performance while achieving only a moderate financial gain

So why do it at all…??

- They wanted to optimize their plants
- Responsible stewardship
- They were game to try
- Partnership & Trust

ADEM Wastewater Treatment

More than just
a reason to pay
a sewer bill.

Keep in mind…

- **The utility of the future is going to look beyond JUST compliance**
- **This energy savings stuff is really catching on**
- **Many utilities are paying consultants a lot of money to do what we're going to do for you**

Sheffield WWTP

Extended aeration plant

3.9 mgd plant design; handling only about 1.2 mgd nominally

•Conventional loading: CBOD about 140 mg/L

•Three 125 hp Delta PD blowers; fine bubble. Operate only one blower

Sheffield WWTP

Blowers are on VFDs

Plant power consumption is about 64,500 kWh/Mo

Electrical use: 1800 kWh/MG

2.2 kWh/lb BOD removed

Sheffield WWTP

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Sheffield WWTP

We recommended that Sheffield lower its DO setpoints

The plant now runs anoxically, with plant aerators shut off for 4-6 hrs per day.

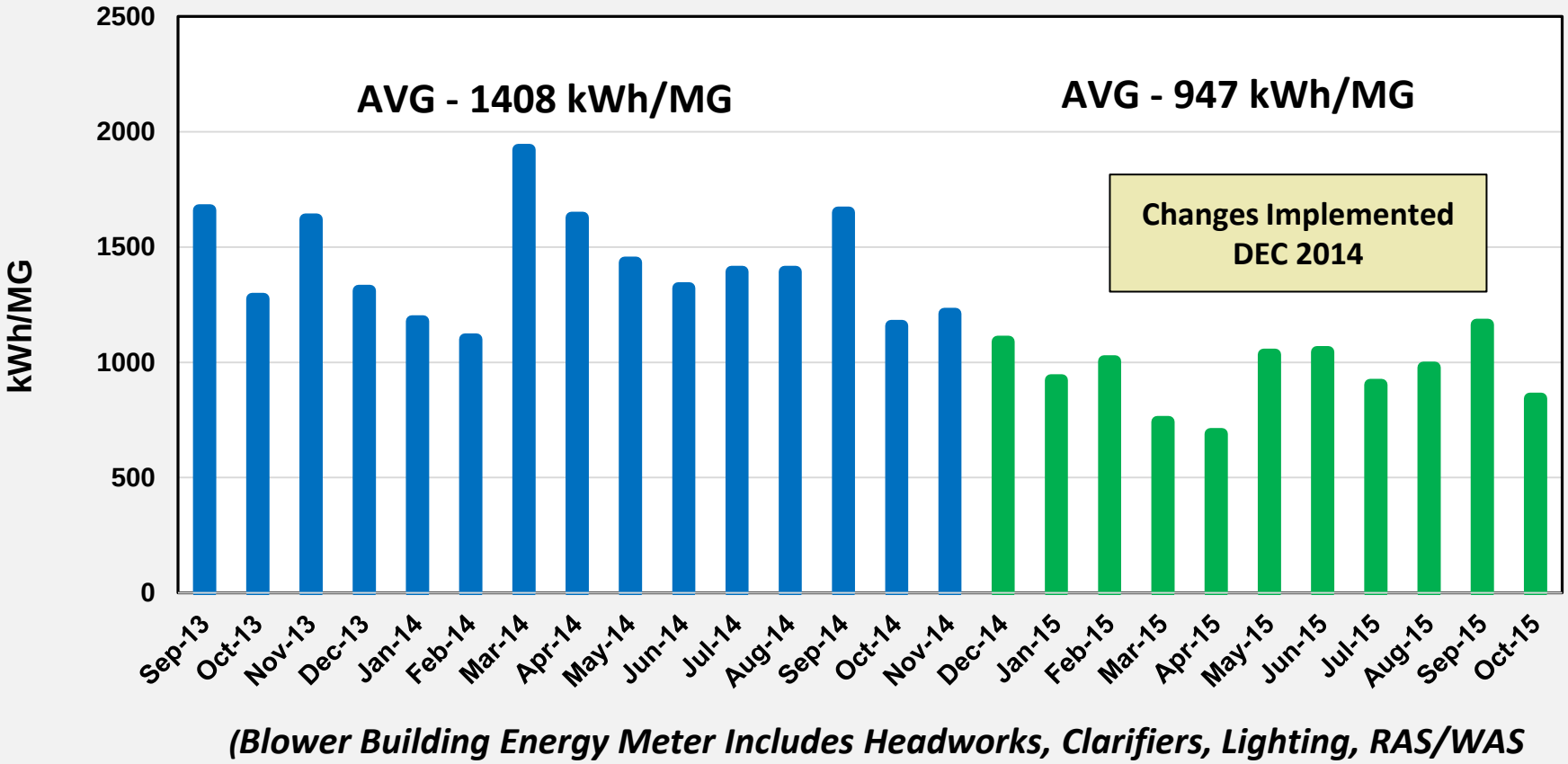
They have reduced the amount of total nitrogen discharged to the Tennessee River by 19.3 tons per year..!!

Sheffield WWTP

Nitrate levels in plant effluent dropped from 14-16 mg/L in 2014 to less than 2 mg/L in 2015 and 2016 (avg monthly values)

The plant now runs anoxically, with plant aerators shut off for 4-6 hrs per day.

Sheffield, AL Blower Building Energy Use - kWh/MG



(Blower Building Energy Meter Includes Headworks, Clarifiers, Lighting, RAS/WAS

Results Summary (achieved at no implementation cost):

- **Blower Bld. Energy Savings:** 20% in kWh/MG
- **Annual Rate of Cost Savings:** $9,000
- **Cumulative CO2 Reduction:** Over 71 Tons/year
- **Effluent Nitrogen Reduction:** 19.3 Tons/year (66%)

Sheffield WWTP

Note that there was an early operational challenge:

The operator allowed the aerators to stay off too long during the second month of implementation

- **Ammonia-N level rose from 0.3 to 14 mg/L**

Sheffield WWTP

The plant operator called the project team up and we discussed the matter

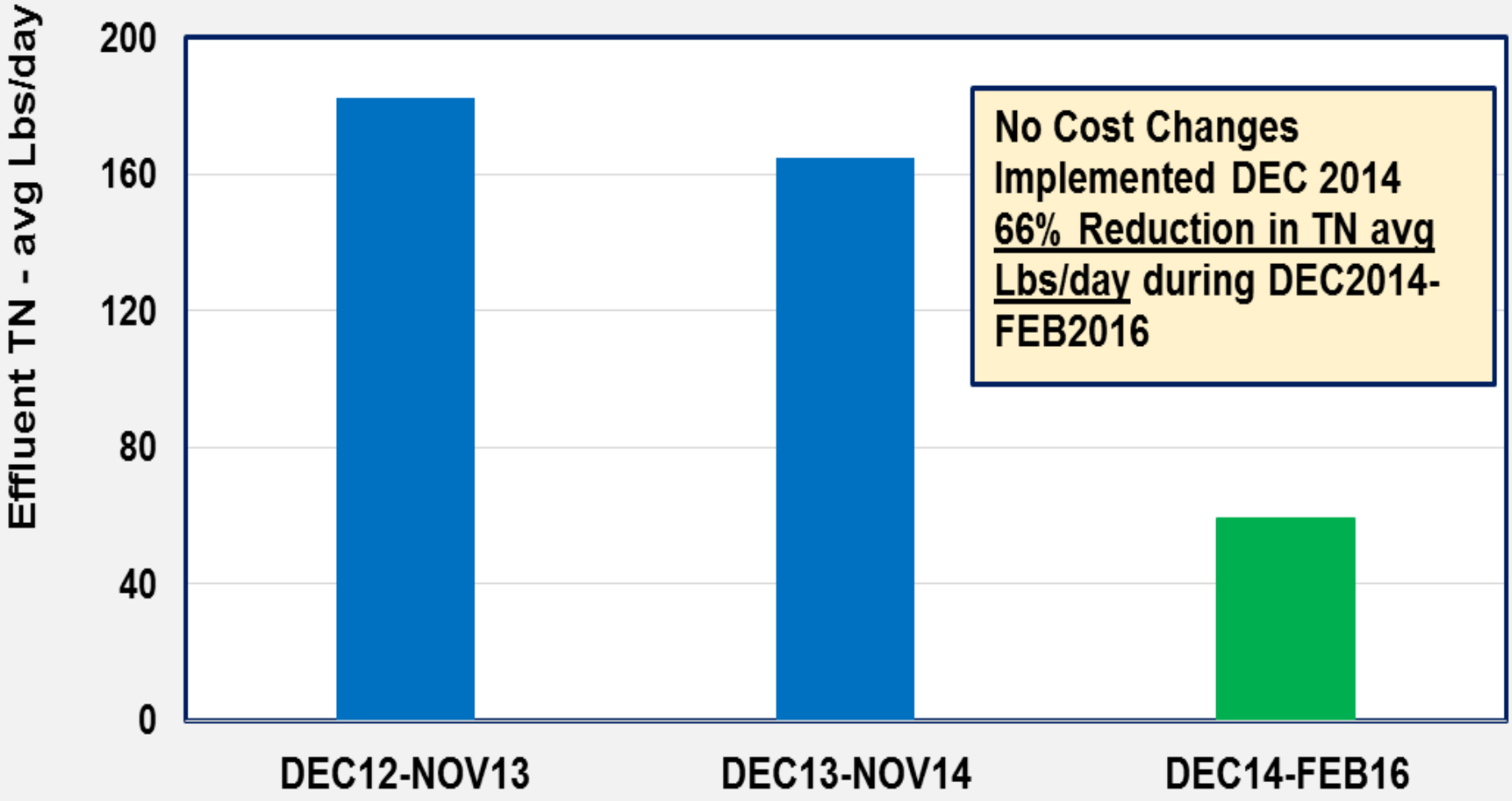
The resolution was simple: A slight DO setpoint adjustment brought the plant back to achieving excellent nitrification once again. Immediately resolved.

Sheffield WWTP – Key Points

Your biological treatment plant is a dynamic system that responds quickly to operator control

Control the plant performance using your talents as a certified operator

Sheffield, AL WWTP - Monthly AVG Effluent TN Lbs/day



Muscle Shoals WWTP

Extended aeration plant

4.0 mgd plant design; handling only about 1.4 mgd nominally

- Conventional loading: CBOD about 170 mg/L

- Two 250 hp centrifugal blowers & two 150 hp blowers; fine bubble.

Muscle Shoals WWTP

Blowers are NOT on VFDs

Plant power consumption is about 120,000 kWh/Mo

Electrical use: 3100 kWh/MG

2.2 kWh/lb BOD removed

Muscle Shoals WWTP

Blowers are NOT on VFDs

Plant power consumption is about 120,000 kWh/Mo

Electrical use: 3100 kWh/MG

2.2 kWh/lb BOD removed

Muscle Shoals WWTP

Muscle Shoals WWTP

The plant now also runs anoxically, with plant aerators shut off for 5 hrs per day.

Nitrate levels in plant effluent dropped from 21mg/L in 2013/2014 to about 13 mg/L in 2015 and 2016

Muscle Shoals WWTP

Also, because they are now operating in the denitrification mode, Muscle Shoals ceased having to add alkalinity in the form of $Mg(OH)_2$

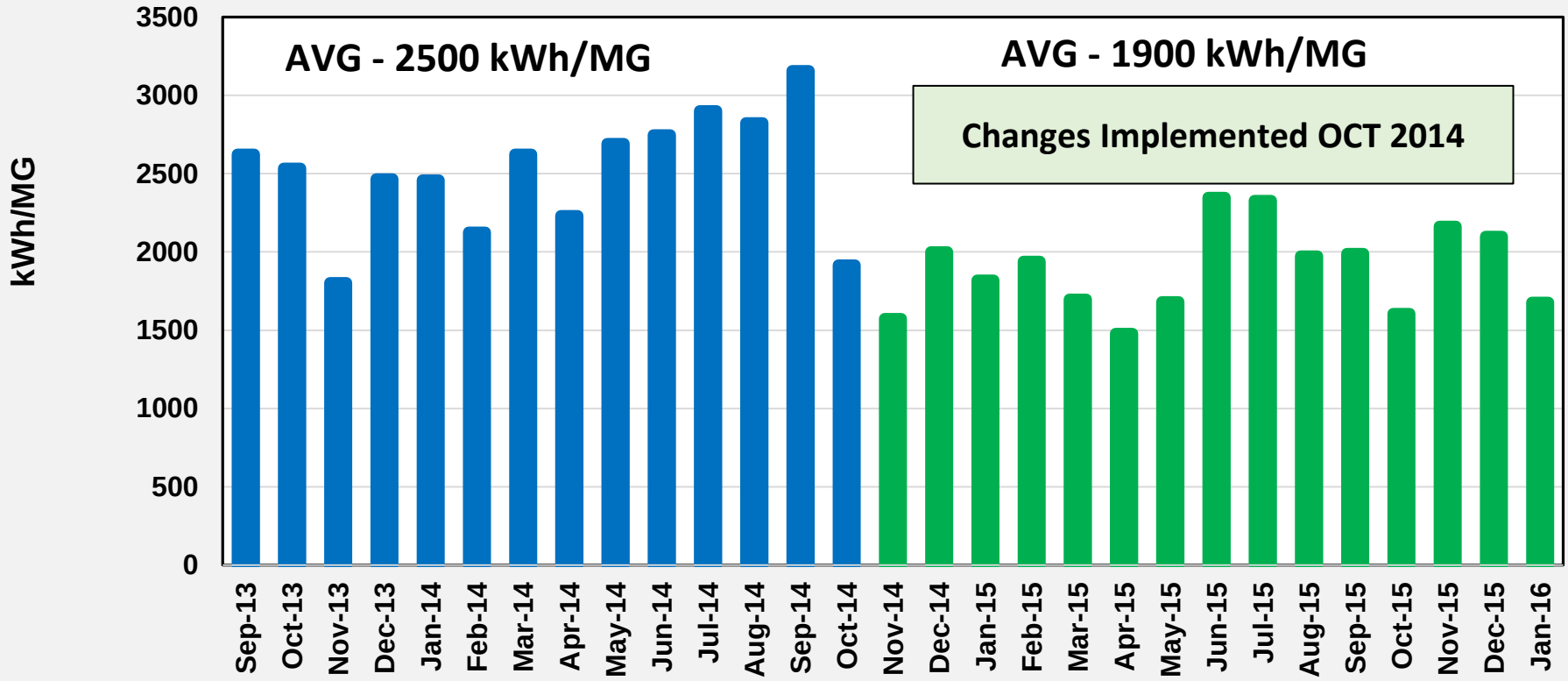
They now don't have the hassle of adding alkalinity and save $700 per month in chemical costs

Muscle Shoals WWTP

Muscle Shoals now never has to operate a 250 hp blower and they rely only on their 125 hp blowers

[They used to run the larger blower in the summer months]

Muscle Shoals WWTP Energy Use - kWh/MG



Results Summary (achieved at no implementation cost):

- **Plant Energy Savings:** 27% in kWh/MG
- **Annual Rate of Cost Savings:** $11,000
- **Cumulative CO2 Reduction:** Over 190 Tons/year
- **Effluent Nitrogen Reduction:** 16.5 Tons/year (33%)

It's not just about denitrification

- We're going to give your plant a very thorough review related to energy savings
- In most plants, we are finding many avenues for cost savings

It's helpful to have other professional weigh-in on the not-so obvious

"A lot of folks have been eating corn lately."

Keep Striving for operational efficiency..!!

…goes hand in hand with energy efficiency

The Energy Savings Challenge

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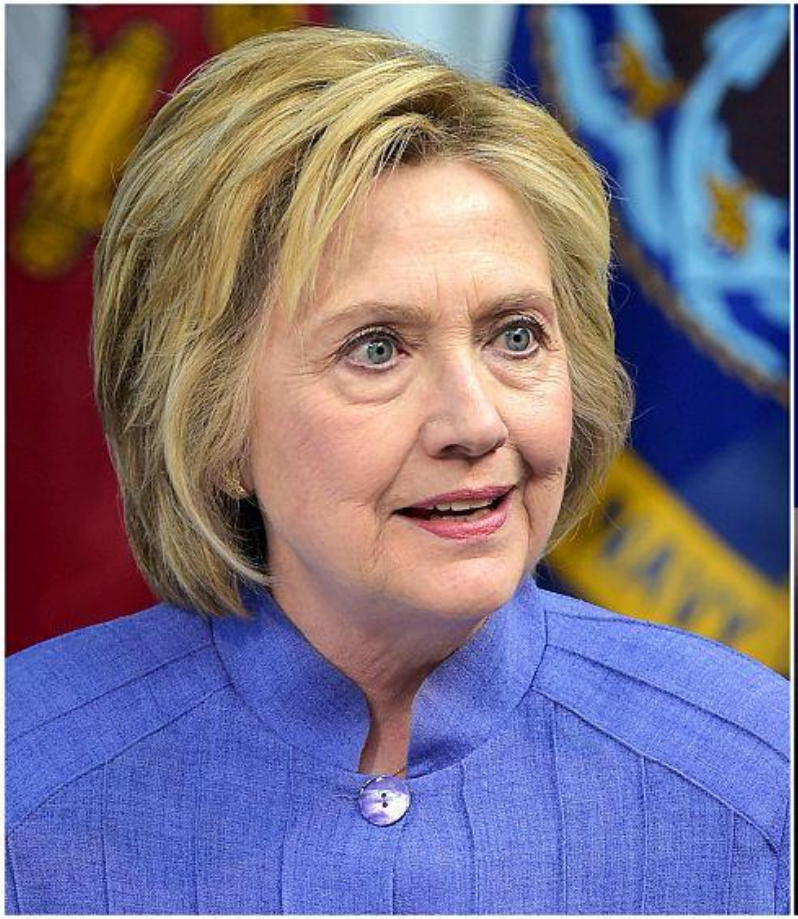
The big problems will happen, but this is a fun project

ADEM

‘Nuff said…



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Questions..?

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